Sanborn

# Trends and Issues Affecting Wisconsin's Forests Now and Into the Future

This report provides an assessment of Wisconsin's forest resources from ecological, social, and economic perspectives. This information provides DNR Forestry with the basis for the next step: planning—along with our partners and public—for the sustainable management of our forest resources now and into the future. During 2000–2001, we will work with others who care about Wisconsin's forest resources to develop a statewide forest plan. Because those participating in this planning process will no doubt be focusing on trends and issues, we provide the following overview of some trends and issues that will likely play a part in planning discussions. This is by no means an exhaustive list—and it offers no position on issues or solutions to problems. Rather, we hope that by briefly describing some of these trends and issues, we can begin to create the bridge between assessing our forest resources and planning for their future management.

## Ecological

There are a number of trends and issues regarding species composition, age-structure, and other ways that foresters and other resource managers analyze forest resources.

### Trend: Wisconsin's forests are aging and forest succession is occurring.

Wisconsin's forests are aging. Most of the state's forestland is a result of regeneration or planting in the early to mid-1900s. Mid- to late-succession maple-basswood forests are replacing the early succession aspen-birch and oak forests of the '40s–'70s. The forest inventory of 1996 was the first Wisconsin inventory to show more maple-basswood acres than aspen-birch. Aging forests—and the associated species composition, structure and function changes—impact economic and recreational opportunities, as well as biodiversity.

### Trend: Forestland is increasing.

Between 1983 and 1996, Wisconsin's forestland increased by 640,000 acres. This trend of increasing forestland began in the 1960s and is mostly the result of marginal agricultural land converting back to forests.

## Issue: Some species are declining.

Some tree species have declined or effectively been removed from Wisconsin's forests. American elm and butternut have declined in recent years. American chestnut has effectively been removed from Wisconsin's forests. Dutch elm disease, butternut canker, and chestnut blight have seriously impacted these beautiful and valuable tree species. Some individual trees show resistance to the various diseases, but not enough to hope for recovery in the near future. Jack pine and the jack pine forest type acreage is also decreasing. Much of the acreage is being replaced with other pine or oak species. The oak in particular reflects a later successional type due to a management choice or lack of disturbance, primarily fire.

## Trend: There is limited oak regeneration in southern Wisconsin.

On a statewide basis, oak-hickory acreage increased slightly between 1983 and 1996 (primarily on very sandy sites); however, acreage decreased in southern Wisconsin. This trend is most likely a result of aging, concentrated oak-hickory forests in southwestern Wisconsin with continued heavy selection harvests, which increase the rate of succession to elm-ash-soft maple and maple-basswood types. This, in conjunction with the difficulty in regenerating the mid-tolerant northern red oak on good sites in southwestern Wisconsin and the resulting large decrease in seedling-sapling acreage, provides support for a continued decline in oak-hickory acres and the red oak species in southern Wisconsin.

## Issue: information about biodiversity is scarce.

We are still exploring and learning about biodiversity and what it means to human beings and to the forest. There are clearly holes in our knowledge. For example:

- We do not have a good understanding of the diversity of Wisconsin's non-vascular plants, invertebrates, or herptiles.
- Genetic diversity within species is something we're just beginning to examine.
- The relationship of forest composition and structure to ecosystem function—a critical piece of the puzzle—is not well understood beyond some basic knowledge of nutrient and energy cycles.
- An understanding of the different scales at which biodiversity is important is also just emerging.
- The positive and negative impacts of forest succession on species diversity are not well known.
- The role of reserves, buffers, and corridors need further study to clarify the relationship with conserving biodiversity.
- The importance of coarse woody debris within forest is a stand attribute that can be managed for; however, guidelines need to be developed for various forest types and sites.
- Monitoring management activities and developing feedback mechanisms need to be refined in order to understand forest changes and subsequent adaptive management.

DNR Photo Archives

*The wood turtle is a threatened reptile.*

## Issue: It is a challenge to make scientific information relevant to decision-making.

Forests are complex. Describing even what we do know about forests in ways that can be readily understood and used by people who want to participate in planning for future forest management is an increasing challenge for natural resources professionals. The good news is that with tools such as Geographic Information Systems (GIS), we can provide very useful visual aids to help people think about multiple layers and scales of information.

## Trend: The list of threatened and endangered species is growing.

Currently there are 33 threatened and 34 endangered Forest species listed on either the Wisconsin or federal endangered and threatened lists. These numbers are up from 1985, the time of the last assessment. These latest listings are concentrated in the invertebrate and plant categories. The increase in listed species is largely due to our increasing knowledge about a wider variety of species and their habitat needs.

## Issue: Invasive exotic species are an increasing threat.

Human activities—trade, travel, gardening, and recreation—have resulted in many species not native to Wisconsin being introduced to the state. Some of these new species cause problems in native ecosystems. Exotic species often have few if any competitors or predators, making it easy for them to take over an ecosystem, significantly altering the structure and diversity of the system. The gypsy moth, Asian long-horned beetle, Dutch elm disease, garlic mustard, and Japanese honeysuckle are some of the exotic species that have invaded, are invading, or pose a future threat to Wisconsin's forests.

Dean Tvedt

*We are losing some important ecosystems such as savanna. Kettle Moraine State Forest.*

## Issue: Some ecosystems and important development stages of ecosystems are rare.

Savannas, barrens, and advanced successional stages are ecosystems that have become extremely rare. Savannas, for example, were once common ecosystems that are now very rare. They have been converted to farmland, succeeded to forest, or changed in land use to urban development. Barrens were historically rare and now have become globally imperiled. These forest systems have also been altered in their composition, for example through increased plantations or stocking of trees in barrens and savanna, as well as through fire suppression in systems that are fire-dependent. Hemlock relicts are declining due to deer damage, poor regeneration, and conversion of land to other uses.

Common ecosystems present concerns due to changes in integrity. For example, riparian forests are becoming significantly degraded. Human activities are impacting communities along rivers and streams. Development, agriculture, and pollution have impacted many riparian forests, affecting the native biodiversity [DNR, 1995].

## Issue: Forest disturbance patterns are changing.

Forest disturbance patterns have changed dramatically over the past century. This has resulted in significant impacts upon forest composition, structure, and function. Once, the dominant short-term disturbance factors in Wisconsin's forests were windthrow, fire, disease, and severe weather. Today, fire has been widely suppressed in our forests. Human-caused disturbance is now predominant in Wisconsin's forests, while disease, windthrow, and severe weather continue as disturbance factors. Various types, intensities and timing of disturbance have different impacts on forest composition, structure and function.

## Issue: Stands of old forest are rare.

Since the Cutover, what people think of as old forest[1] in Wisconsin has been relatively rare, with notable exceptions of stands of old forest in the Menominee Forest (Menominee County), on Goodman Timberland, and in the Connor Forest (Marinette, Forest and Florence Counties). What remains is scattered across the state in very small parcels, mostly in cedar bogs or spruce swamps. Our aging forests provide opportunities to manage for old forest.

## Issue: The forest is becoming more fragmented.

Permanent fragmentation is the process of converting large contiguous areas of forest into smaller patches of forest and non-forest land use in ways that do not allow the forest to regenerate. In contrast, habitat fragmentation temporarily decreases the continuous area of a similar-aged or structured forest, which may impact some species. Temporary habitat fragmentation occurs naturally through agents such as fire, windthrow, or severe weather. Humans can also increase the rate of permanent or habitat fragmentation in Wisconsin's forests. Road building, agriculture, and urban development all contribute to permanent fragmentation, whereas timber harvest contributes to habitat fragmentation. However, there are dramatic differences between the impacts of temporary habitat fragmentation, such as timber harvest, which provides for regeneration of the forest, and fragmentation under conditions that create permanent or very long-term alterations to forest systems, such as development and agriculture. Like many of the issues identified in this section, this one is much debated.

## Trend: Average acreage burned by forest fires has declined.

Great strides have been made in controlling forest fires since initial efforts to suppress fires over 70 years ago. The annual acreage burned in Wisconsin has declined with improvements in forest fire detection and suppression techniques, saving lives, property and forest resources. However, weather continues to play a critical role in determining the number and extent of fires in any given year. It has been more than a decade since Wisconsin has experienced prolonged severe fire weather.

## Issue: Control of fire affects forest composition.

The control of forest fires in Wisconsin is a necessity given the juxtaposition of forests, people and property. The suppression of forest fires affects the composition, structure and function of forests by facilitating the conversion of non-forested land to forest. Controlled fire is increasingly used as a tool to mimic the attributes of fire in maintaining some forest and non-forest ecosystems, including prairie, oak savanna and pine barrens.

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[1] The term "old forest" includes relict forest, old growth reserve, managed old growth, extended rotation, and miscellaneous old forest. From draft report compiled by the DNR's silviculture committee [DNR, 1996].

## Economic

Forests and other natural resources have provided the base for human economic activity since the first economic system was developed. In Wisconsin, the forest products industry and forest-based recreation are both very important to our state and local economies. People also place economic value on forest aesthetics and forest ecosystem functions.

Economic trends can be very dynamic. Individuals often have very different ideas about what the economic priorities and needs for a community should be. These reasons, among others, can create contentious issues regarding forest uses. There are a host of important factors coming together to shape Wisconsin's forest uses. The special character of the timber and tourism industries impact how they function, as does the high value that people place on forests and forest activities.

The economic value of the ecological functions that forests provide, although often overlooked, is also important. Erosion control, nutrient cycling, and flood control are examples of important functions performed by forests that have obvious economic worth.

Some important trends and issues in the forest economics arena include:

### Trend: Succession is changing forest composition and potential forest products.

As discussed previously, Wisconsin's forests are maturing, succeeding from an aspen-birch dominated composition to maple-basswood and other mid-to late-successional forest types. This change in species composition will have a major impact on the forest industry and the goods it produces.

The transition of Wisconsin's northern forests from early successional to late successional forest types is the key factor that will affect the forest industry in the future. This transition will cause the industry to adapt to use more soft hardwoods, such as red maple, for both pulpwood and sawlogs. Along with this transition to later successional forests comes an increase in tree size in the predominate species, such as maple, which will help supply the sawmills.

The southern forests in Wisconsin are predominately oak-hickory forest type and are transitioning to maple-basswood and elm-ash-soft maple types. In this part of the state there may be a greater dependence on the production of pulpwood and a consolidation of sawmills due to a reduction of sawtimber supply from the southern broadleaf forest.

### Trend/Issue: Demand for forest products is increasing.

There is an increasing demand for wood and wood products globally, including the products that Wisconsin's forests provide. Paper, timber, furniture, crates — even syrup and wild mushrooms — are experiencing an increased demand. This increase in demand can be met in a number of ways. Increased importation, increased production through forest management, shifting harvests to other states and/or countries, shifting harvest to other species, increased efficiency in production, recycling, reuse of products, shifting demand to non-forest products, and reducing demand together form the range of alternatives, all of which have environmental, economic, and social consequences.

Pukall Lumber, Inc.

*Demand for forest products is increasing all over the world. Wood furniture and flooring, Pukall Lumber, Inc, Woodruff*

Robert Queen

*More people choose to recreate in Wisconsin's forests each year.*

## Trend: Demand for forest-based recreation and associated services is increasing.

More people within Wisconsin want to use our forests for recreation. Forest recreation in general is growing in popularity, i.e. a growing percentage of Wisconsin's citizens participate in forest recreation, and there are more people in Wisconsin to participate. A growing population of retirees also increases the interest in all sorts of recreation, including forest-based recreation. The increase in retirees using Wisconsin's forests for recreation also increases the demand for some types of services associated with forest recreation like lodging, restaurants, and retail stores.

## Issue: Forests are in demand for a mix of uses.

More forests are being used and managed for multiple economic and other benefits. For example, many forest areas can support both timber removal and recreation. There are, however, trade-offs that are made when choosing what benefits to use a forest for. Some uses—like wilderness—preclude other uses—like timber harvest. Because these activities rely on the same resource base, it will become increasingly important to coordinate activities in a way that will allow many uses of the forest.

## Issue: "Green" accounting is a new way of evaluating forest benefits.

There are functions that a forest serves that are not considered in traditional economic accounting. For example, while most people value clean air and water, there has not been an accepted method of calculating the value of the environmental functions a forest provides. The difficulty in accounting for these values can lead to a lack of understanding when assessing the economic value of forests. Likewise there has not been a way to establish the value of forest aesthetics or other societal values. New research is developing ways to assign value to these aspects of forests (a concept called "green" accounting).

Robert Queen

*The DNR's Division of Forestry supports sustainable management for Wisconsin's forests.*

## Issue: Sustainable management certification is emerging.

The forest products economy is a global one. High value veneer timber is likely to be shipped around the world, while wood for lumber and pulpwood is usually processed in the same region in which it grew. An outgrowth of the global marketplace has been the call for "green certification" of forest products. The stamp of certification is meant to assure the buyer that the product came from sustainably managed forestland. There is currently a wide range of certification systems, including Forest Stewardship Council, Sustainable Forestry Initiative, American Tree Farm, and International Standards Organization (ISO) 1400. Several Wisconsin lumber producers are choosing to become certified.

## Trend: Recycling is increasing.

Recycling of paper and wood products has increased dramatically over the last inventory period. Nationwide, between 1970 and 2000, recycling has increased from under 7% of total waste to about 30% of total waste [EPA, 2000]. In weight, that increase has been even more dramatic, as our waste production has also increased significantly.

### Trend: Efficiency in use of wood has increased.

With improved technology for harvesting and milling, processing wood is now more efficient. More of the tree can be utilized at each step of the process, and new markets are being developed for wastes, such as saw dust, that once were discarded.

## Social

As discussed previously in this report, Wisconsin's forests are used by citizens for a wide variety of activities. Both numbers of participants and types of activities are increasing. Following are some trends and issues that represent the social part of the management equation.

### Trend: Large blocks of industrial forests are changing hands rapidly.

In recent years we have seen an increase in transfer of large blocks of forested lands between industrial companies, and in some notable cases, out of industrial ownership and into government or non-industrial private ownership. This trend may have important ecological, economic, and social implications for the future as these large forested land holdings are divided and, potentially, converted from forested lands to other land uses.

### Trend: More people are purchasing forested lands.

While public ownership of Wisconsin's forests is increasing through state and county acquisitions, the number of non-industrial private owners of forested land is also up, due to the division of forested lands into smaller parcels. Forested land is now highly valued for home sites and recreational areas. Associated with more owners is more fragmentation—more roads, more yards, more houses, more paths, etc.

### Issue: Private forestry assistance is needed.

With the increasing number of non-industrial private forest land owners, it is becoming more difficult to provide professional forest management guidance to these landowners. It is estimated that only about 20% of these landowners receive professional assistance prior to having timber harvested from their lands. With over nine million acres of forest land, the management of these non-industrial private lands are critical to ensuring the sustainability of Wisconsin's forests.

### Trend: Demographics of forest land owners is changing.

Today, forested parcels are more likely to be purchased by people who have different values than the forest owner of the past. Rather than the farmer who owned forest and used it primarily to supplement his income, many of today's new forest owners are from urban areas who own forest for primarily recreational use or aesthetic values. These newer private owners tend to be more cautious about harvesting their timber, less knowledgeable about rural areas and the forest they've moved to, wealthier than past owners, and more likely to be absentee landowners.

## Trend: Less forested land is accessible for public use.

With changes in ownership of industrial lands and demographic changes in non-industrial private land owners, the amount of forested land open for public use is decreasing. This trend has implications for the future of public hunting, fishing, and other forms of recreation.

## Trend: Stakeholders are more involved in forest decisions.

For a number of reasons, there is increased participation by a variety of stakeholders in decisions affecting forest policy and management of public lands. Various levels of government, local community groups, concerned industry groups, recreational users, property owners, and environmental groups are often a part of major decisions affecting Wisconsin's forests.

## Issue: Conflicting use of forests is a public debate.

Forests are used for recreation, to provide aesthetic beauty, to produce forest products, to maintain water quality, and to preserve wildlife habitat, among many other uses. Not all of these uses are always compatible in the same forest. The debate among people who value the forest for different reasons has grown in recent years. Some forest uses and some forest management techniques are controversial. This debate will continue to inform management decisions made in Wisconsin's communities.

## Issue: Clearcutting and even-age management techniques are controversial.

Clearcutting is a timber harvesting process that removes all trees from an area at the same time. This method typically encourages the management of earlier successional species in forest types that have a uniform age. This even-age management technique, along with other techniques (such as seed tree and shelterwood harvests), create aesthetic and ecological changes to a forest. A variety of forest values (both aesthetic and ecological ) benefit from this activity while at the same time a variety of values are negatively affected. The trade-offs typically polarize advocates for specific forest values. Forest types that are favored with these techniques are pioneer to mid-successional types. Other disturbances, either natural or human caused disturbance (such as fire), could be used to maintain these types. Fire has historically been suppressed or not used in forest management prescriptions due to public health and safety concerns or the lack of technical experience and resources. The use of even-age techniques and other disturbance oriented management tools (like prescribed fire) will continue to be an issue of conflict.

## Issue: Role of Public Forests.

As our growing populace places more extensive and diverse demands on our forests, the conflict is most acutely felt on the public forests. The federal, state, county and local forests have, to varying degrees, been subject to increasing conflicts between various interests and among various users. The role of public forests at different scales needs to be more clearly defined, and the implications of possible decisions made clear.

## Trend/Issue: Motorized recreation is becoming more popular.

Snowmobilers, off highway vehicle users, four-wheelers, and dirt-bikers are taking to the forests in ever-increasing numbers. There are a number of issues associated with this trend. There are more complaints of crowding on trails used for motorized recreation and more conflict with other types of recreationists. There are also safety and environmental concerns associated with motorized use of the forests. Ecological impacts on the trails—exhaust fumes, trail erosion and rutting, noise—can cause environmental problems in the immediate area, as well as in habitat off the trail. Motorized recreationists also tend to spend more money recreating than other types of recreationists, thus providing greater financial support for the community in which they recreate.

## Trend: More trails are being created and used.

Trails have become very popular throughout the United States, and Wisconsin is no exception. The "rails to trails" program, the national trail system, and the general interest in trail activities has resulted in many new trails being constructed and used in Wisconsin's forests. Trails are used primarily for hiking, running, walking, biking, horseback riding, snowmobiling, and backpacking.

## Issue: Development is increasing in fire-prone areas.

As development continues to expand into forested areas of the state, there is an increasing fire risk, particularly in those parts of the state which have high fire potential. The absence of prolonged severe fire weather throughout the 1990s has the potential to embolden those who wish to develop in fire prone areas. The increased human presence in the wildland/urban interface presents a major challenge in protecting life, property and the forest resource from destructive forest fires.

DNR Photo Archives

## Trend/Issue: Consumption patterns are not linked to production.

Americans continue to increase their consumption of forest products, while at the same time many are calling for reducing the amount of forest land that is actively managed to produce those products. The disconnect that occurs between resource production and resource consumption is causing ecological, social and economic consequences, including here in Wisconsin. These consequences include the shifting of harvests to different parts of the country and world, consumer decisions about product choices and land use choices.

## Urban Forests

Along with increasing understanding of the importance of our urban forests comes a variety of issues centered on economics, planning, environmental justice, quality of life, and personal taste. Here are some of the trends and issues associated with urban forests:

### Trend: Urbanization is increasing.

Wisconsin is becoming more urbanized, increasing demand for additional community green space, and putting use pressure on existing urban and nearby recreational green space. Communities are becoming more aware of the need to manage their urban forest and more are doing it; however, the pressure on limited resources to maintain other infrastructure is also increasing.

### Trend: Development is increasing.

Development continues to encroach upon forest land in Wisconsin. This trend is expanding the extent of urban forests while decreasing and fragmenting rural forests. People with urban attitudes and expectations are moving into rural areas and lake-front developments. This affects how the forest is used and impacts the ecology of these areas.

### Issue: Absentee landowners affect urban canopy.

There is less concern for urban land stewardship from absentee landowners and renters, so trees and other vegetation are not managed and not replaced as they die. This results in declining canopy in lower socioeconomic areas dominated by rental properties.

### Issue: Exotic species threaten urban forests.

Invasive, exotic species planted by urbanites may threaten natural areas in and around communities. Urban forests may become a focal point in a conflict between the traditional horticultural industry and ecological preservationists.

Specifically, gypsy moth is making its way westward in Wisconsin. Impacts of the moth on the urban forest can be very distressing for community residents, and stop-the-spread and control measures can be controversial.

## Global Issues

Wisconsin's forests are increasingly influenced by global trends. Improved global communication and new global economies present new challenges and opportunities for Wisconsin's forests.

### Trend: Warming of the earth may affect forest composition, structure and function.

It is becoming increasingly clear that the earth is warming. However, much is unclear about the long-term effects of this trend. Ecologists speculate that long-term global warming may result in a corresponding response in natural systems that could mean significant changes in forest composition, structure and function.

### Trend/Issue: Exotic species threaten ecological balance.

Exotic species are an increasing threat to Wisconsin's forests and other ecosystems. Exotic species make their way into Wisconsin through many avenues. Horticulturists have introduced some, like gypsy moth, buckthorn, and Japanese honeysuckle. Others, like the Asian long-horned beetle and the fungi that cause Dutch elm disease and oak wilt, are the result of global trade, through which forest products from other areas of the world are shipped to the United States. With global trade continuing to increase, the potential for new introductions of exotics is also increasing.

### Issue: Forests affect carbon emissions and sinks.

Wisconsin's land-use is resulting in a net greenhouse gas emission (EPA, 1997). The conversion of forest and farms to other uses results in the emission of carbon dioxide and other greenhouse gases. Human-caused greenhouse gas emissions result in global warming. However, Wisconsin's forests are powerful challengers to global warming. A good portion of trees and other living things are made of carbon. As trees and forests grow, they remove carbon dioxide from the air and release oxygen, using the carbon to maintain themselves and grow. Forests provide a very significant carbon sink that helps to combat global warming.

### Trend: Global demand for wood products is increasing.

As world populations increase, the demand for wood and wood products continues to increase. Wisconsin will be affected by this trend as the desire for forest product sustainability and national self-sufficiency increases.

## Issue: Sustainable forest products may provide a global advantage.

Wisconsin's forests have been increasing in volume for decades. To meet increasing global demand for wood products, sustainable forest management in Wisconsin forests has the potential to take some of the pressure off more at-risk forests in other areas. Forest products sustainably produced in Wisconsin may be a good substitute for products made from wood harvested in tropical or boreal forests, where sustainable harvest is more difficult to maintain.

## Issue: Criteria and indicators for sustainable forestry being developed.

Wisconsin forest managers are joining other landowners across the country in meeting the commitment the U.S. made as part of the Earth Summit to practice sustainable forestry. Accomplishing this requires the development of criteria and indicators that we can use to gauge progress. Sustainability criteria are being developed for rural Lake States forests as well as for urban forests (see Appendix 3).